p. 277, 1837, toward a complete monograph, "Muscular System of *Apteryx*."

If Prof. Ray Lankester should find time to refer to Trans. Zool. Soc. vol. ii. p. 271, which he deems to testify to the error he kindly proposes to rectify, he may find sufficient ground for the present Note.

I beg to express my obligation for his endeavour to expose the strange blunder into which the Professor supposes me to have fallen.

2. Notes on the Characters of the different Races of *Echidna*. By Oldfield Thomas, F.Z.S., Natural History Museum.

[Received March 10, 1885.]

(Plates XXIII., XXIV.)

Through the kindness of Prof. Moseley, the Natural History Museum has obtained a female specimen, collected by the Rev. W. G. Lawes, of the New-Guinea *Echidna* described in 1877 by Mr. E. Pierson Ramsay of Sydney as *E. lawesi*; and, in the process of working out and making notes upon this interesting animal, I have obtained such a series of specimens of various sorts, that I find myself able to offer some notes on the characters of the different races of *Echidna*, and on their relations one to another.

Of the large series of specimens examined I would especially draw attention to:—(1) A second individual of *Echidna lawesi*, also collected by Mr. Lawes, and lent to me by the authorities of the Liverpool Museum, to whose Curator, Mr. T. J. Moore, I beg to offer my sincere thanks for the loan; and (2) the typical specimens, belonging to the Christiania Museum, of the species described by Dr. Robert Collett in this year's 'Proceedings' as *Echidna acanthion*, which have been kindly lent to me by that gentleman. I must also offer my thanks to Dr. J. G. Garson, of the Royal College of Surgeons, Dr. Lütken and Dr. Winge, of the Copenhagen Museum, Dr. F. A. Jentink, of Leyden, and Prof. A. Dubois, of Brussels, either for the loan of specimens, or for measurements, drawings, and other particulars kindly forwarded me by letter.

It was very early perceived, in fact by Sir Everard Home in 1802[1], that the Tasmanian *Echidna* was different in many respects, especially in the characters of its external covering, from that found on the mainland; but authors have not agreed as to the value to be attached to the characters of the two forms, some considering them to be quite distinct species, while others have thought them to be only climatic races, and others again have treated them as one, without taking any note of the differences that are undoubtedly present between them.

To estimate the value of these differences, to compare with the long-known southern and central forms the recently described *E. lawesi* and *E. acanthion*, and to show what differences are due respectively to age, sex, geographical distribution, and climate, are the chief objects of the present paper.

[1] Phil. Trans. 1802, p. 348, pls. x. & xiii.

To commence with, the following List of specimens examined is given. The specimens will afterwards be merely referred to by their distinguishing letters:—

Specimens.

Var. *lawesi*:—			
a. Adult skin, ♀.	Port Moresby.	Rev. W.G. Lawes.	85. 3. 24. 1[1].
b. Ditto, ♀.	Ditto.	Ditto.	1037, Liverpool Museum.
Var. *aculeata*:—			
c–e. ♂, ♀, and yg. skins.	80 miles W. of Rockhampton, Queensland.	Dr. C. Lumholz.	Christiania Mus. (Co.-types of *E. acanthion*, Coll.)
f. Imm. ♂ (in al.).	Queensland.	Sir D. Cooper.	66. 7. 3. 1.
g. Ad. sk. ♂.	Liverpool Range, New South Wales.	J. Gould, Esq.	41. 1163.
h. Ad. ♂ (in al.).	Port Stevens, New South Wales.	Dr. G. Bennett.	72. 11. 8. 1.
i–m. Skins.	No exact localities, probably New South Wales.		
n. Ad. sk.	York, West Australia.	J. Gilbert, Esq.	44. 7. 9. 18.
o. Ad. sk.	West Australia.	– Austin, Esq.	56. 4. 7. 4.
Var. *setosa*:—			
p, *q*. ♂ ♀ (in al.).	....	Dr. Müller.	64. 10. 1. 3–4.
r–v. Skins.	No exact localities, probably Tasmania.		
w, *x*. 2 ♂ (in al.).	Tasmania.	Jamrach.	69. 5. 21. 1–2.
y. ♂ (in al.).	Ditto.	Capt. Mangles.	
z. Ad. skin.	Ditto.	Ditto.	
a'. Ad., stuffed.	Ditto.	....	112 *b*.
b', *c'*. Ad. & yg., stuffed.	Ditto.	J. Gould, Esq.	41. 1162 & 4.
d'. Yg. sk. ♂.	Ditto.	Gen. Hardwicke.	112 *a*.
e'. Ad. ♂, stuffed.	Ditto.	Mr. Maddox.	238 *c*, Liverpool Mus.

Skulls.

Var. *lawesi*:—			
f', *g'*. Skulls of *a* & *b*.			
Var. *aculeata*:—			
h'–j'. Skulls of *c–e*.			
k'–m'. Ditto, *f–h*.	....	....	1017 *g*, *d*, & *h*.
n'–o'. Ditto, *k–l*.	....	....	1017 *e* & *f*.
p'. Skull.	West Australia.	....	1017 *a*.
q'. Ditto.	....	....	1017 *c*.
Var. *setosa*:—			
r'–s'. Skulls of *p* & *q*.	....	....	1006 *c* & *d*.
t'–w'. Skulls of *v*, *w*, *d'*, & *e'*.	....	....	1006 *f*, *e*, *g*, & 71, Liverpool Mus.
x', *y'*. Skulls.	....	....	1006 *a* & *b*.
z'. Imm. sk.	Tasman's Peninsula, Tasmania.	G. S. Baden-Powell, Esq.	3957, Coll. Surg.
a''. Ad. skull.	Tasmania.	R. Gunn, Esq.	3955, Coll. Surg.
b'', *c''*. Ditto.	....	....	3952 & 3958, Coll. Surg.
d''. Skull of *r*.	....	....	1006 *h*.

[1] Except where otherwise stated, these numbers refer to the registers in the Natural History Museum.

Commencing with the external characters, the first thing to be noticed is the extraordinary difference between the Tasmanian and the northern races in the relative development of the spines and the hairs on the back. The extremes are indeed much further apart than one would ever expect to occur within the limits of a single species, but these extremes grade into each other on the examination of a large series.

In the true *E. aculeata* of New South Wales we find that average specimens are covered with a thick coating of long stout spines, from 35 to 60 millim. in length, with a very sparse and thin undergrowth of hair, visible only upon separating the spines, and quite hidden in the ordinary position of the animal. The head, belly, and legs are covered with a mixture, in about equal proportions, of flattened semi-spinous bristles, and of thin, more or less woolly, hairs. Passing northwards, we find that in Queensland specimens (*E. acanthion*) the hairs of the back are still more reduced as compared to the spines, and that on the belly the flattened bristles tend entirely to supersede the hairs, a tendency carried out completely in *E. lawesi*, where, except in the neighbourhood of the pouch, the belly-hairs are entirely suppressed, and the head and underside are evenly though thinly covered with bristles only. On the other hand, probably owing to the moister climate of New Guinea, the hairs on the back somewhat reassert themselves at the expense of the spines, being in specimen *a* decidedly more visible than in average *aculeata*, and in *b* nearly as prominent as in *setosa*, the spines in both being reduced to from 20 to 35 millim. in length.

Going now southwards from New South Wales, we find that the hair, as compared on the back with the spines, and on the belly with the bristles, rapidly gains the upper hand, until in Tasmanian specimens the spines, especially along the middle of the back, are almost entirely hidden, and the bristles below suppressed, both upper and under sides being clothed with thick woolly hair, some 20 millim. in length, a state of things obviously resulting from the moister and colder climate of Tasmania. There is also a good deal of variation in specimens from the same localities, probably owing to seasonal change; but as I have no dated specimens available, I am unable to speak definitely on this point.

But as to the specific value of this hair-development, we soon find, on looking through a large series, that there are specimens which do not conform to the general rule as to locality; thus specimen *f* from South Queensland, the centre of the *aculeata* range, has its hairy covering developed almost precisely as in average Tasmanian individuals. Again, the fact that the New-Guinea Echidna, coming from a moist though hot climate, should tend to resemble the Tasmanian race in the length of the hair and shortness of the spines on the back, is alone strongly confirmatory of my view that the greater or less development of the hairs is a character so directly climatic, and so easily affected in different localities by a greater or less degree of wet and cold, that it cannot be taken as indicating real specific distinction.

The colour of the *Echidna* varies somewhat owing to the relative development of the hairs and spines and the comparative amounts of brown and white on the latter; but the only strictly geographical variation in colour that I can distinguish, is that southern specimens have a general tendency to have the crown of the head a lighter brown than the back, the converse being the case in northern ones. This is, however, by no means invariable.

The next thing to be considered is the relative lengths of the hind claws, on which great stress has been laid by Dr. Lütken[1], Dr. Collett[2], and others, and indeed the differences in this respect are very remarkable, and might easily be taken to represent specific distinction. The extreme forms are represented by figs. C and D on Plate XXIV., and it will thus be seen that in one form (C) the third claw is nearly as long and as stout as the second, and about twice the size of the fourth; while in the other form (D) the third is scarcely bigger than the fourth, and not more than from one third to one half as large and as strong as the second. The following are the measurements of two extreme examples:—

	Second claw.	Third claw.	Percentage.
	millim.	millim.	
Specimen *s* (Tasmania)	44	39	89
,, *g* (N. S. W.)	39	14	34

This character runs for the most part parallel with geographical distribution, the southern forms having in a general way the long third claws, and the northern the short ones: thus 13 typically hairy specimens of var. *setosa* have percentages ranging from 70 to 100; while the percentages of northern specimens are:—(*e*) 32, (*g*) 34, (*a*) 37, (*b*) 39, &c.; but, so far as regards specific distinction based on this character, we find that certain individual specimens entirely upset the general rule. Thus specimen *l*, very spiny and obviously from the north, has a third claw 28 millim. long, and bearing a percentage to the second of 80, the general size and proportions of claws being quite as in average *E. setosa*. Specimen *f*, also from Queensland, has a third claw 33 millim. long, and 79 per cent. of the second. The two northern races *E. lawesi* and *E. aculeata* are absolutely indistinguishable from each other by this character.

The reason for the greater length of the third claw in var. *setosa* is not very evident; but it may be that the heavier and richer soil of Tasmania requires a more powerful digging organ for its removal, and that by the increase of the length of the third claw this extra power is gained, for it is obvious that in the races with short third claws, the long second one does practically all the work, the third being almost functionless. But by the enlargement of the latter to a nearly equal length with the second, extra power is gained by both claws working side by side, and thus making a broader and stronger digging organ.

Passing now to the characters of the skull, more important and more interesting than any external characters can be, we must first study the influence that age and sex have upon its form and size,

[1] P. Z. S. 1884, p. 150. [2] P. Z. S. 1885, p. 148.

these being, in the absence of teeth, the only characters available for comparison.

With regard to age the following are the measurements of two skulls, both of var. *aculeata*, and both from Central Queensland:—

	Greatest length[1].	Greatest breadth.	Index of breadth[2].	Length of brain-case[3].
	mm.	mm.		mm.
i'. Adult....	110·0	45·0	40·9	52·0
j'. Young ..	94·0	44·0	42·5	48·0

	Length of rostrum[4].	Rostral index[5].	Interorbital breadth.	Capacity[6].
	mm.		mm.	c.cm.
i'. Adult....	52·0	100	14·5	22
j'. Young ..	40·0	83	17·0	22

Taking these two as examples, we see that young skulls have comparatively large rounded brain-cases, short snouts, and broad interorbital spaces. In growing older the size of the brain is nearly unaffected, but the rostrum lengthens and seems to become more distinctly bent upwards; the sutures close, and the various fontanelles fill up, with the exception that the vacuities on the base of the skull, just in front of the condyles (the "condyloid vacuities"), when present, do not apparently close until extreme old age. Altogether, however, there is probably more difficulty in determining the age of specimens of this group than in any other mammals, chiefly of course owing to the want of teeth; and it is only by a comparison of a considerable series that any satisfactory estimate of age can be made.

With regard to the condyloid vacuities another element than age seems to enter into the question. Some specimens, although quite young, have no vacuities (*e. g.* specimen *j'*), while others fully adult, such as *r'*, *s'*, *u'*, &c., have large and open ones (see Plate XXIV. figs. E and F); and this seems to depend in a large measure on locality, as very nearly all the specimens of *E. setosa* that I have seen have open vacuities, while without exception the long-spined northern examples have closed ones. This cannot, however, be used as a specific character, as is shown by the fact that the skull *z'*, from Tasman's Peninsula, Tasmania (No. 3957, Coll. Surg.), although only half-

[1] From the tip of the premaxillæ to the most posterior point of either condyle.

[2] Length : breadth : : 100:—

[3] From the centre of the lower edge of the *foramen magnum* (*basion* of anthropologists) to a point on the palate level with the anterior edge of the lachrymal foramen. This foramen is sometimes entirely closed up, but its position can always be easily made out.

[4] From the same point on the palate to the tip of the premaxillæ.

[5] Length of brain-case : length of rostrum : : 100:—

[6] Measured with No. 8 shot.

The indices Nos. 2 and 5 are of the greatest service, as giving a far more exact idea of the proportions of the skull than any mere measurements can do. The "rostral index" is especially useful in the present group, as the relative length of the snout has such an important bearing upon the general form of the skull.

grown, has yet no trace whatever of condyloid vacuities. To account for the general rule as to these vacuities, I would suggest that it is just possible that desert animals obtain a greater abundance of carbonate of lime and other bone-forming salts than those that live on a rich moist soil, and that the latter would therefore rather avoid using up bony matter in covering a place naturally so well protected by the surrounding flesh and bone as the base of the brain-case, while the former would have no reason to be sparing in the formation of bone[1]. The exception to the rule would also be easily accounted for on this theory, as individuals would naturally occur in particular localities where the soil was either more or less sandy and impregnated with carbonate of lime than the general average of the country.

Passing to the differences due to sex, we find that there is very little constant difference between male and female skulls. In a general way male skulls are broader and heavier, with higher and more inflated brain-cases, larger capacities, and shorter, broader, and heavier snouts. Male and female skulls *r'* and *s'*, being of the same variety, from the same locality, and apparently of exactly the same age, have been figured, Plate XXIV. figs. A and B, and show very fairly the differences attributable to sex.

Eliminating now all characters due either to age or sex we come to the question as to those really distinctive of the different races; and these appear to resolve themselves into two, namely, a marked decrease northwards in the breadth and capacity of the brain-case, and at the same time a slight increase in the relative length of the rostrum. These points are brought out in Plate XXIII. figs. A–D, where the gradual change in form and size from north to south is shown. The following Table, based on fully adult specimens only, gives, by means of averages and indices, further evidences of this general rule.

A study of this Table at once shows the general relationship that the size and shape of the skulls bear to their localities, and at the same time shows that this relationship is not sufficiently constant to serve as the basis for specific distinction; for while the average measurements and indices show distinct geographical variation, yet in several cases individual members of one group fall within the range of variation of the next; and therefore no definition can be framed to embrace all of one variety and to exclude all of another. It is true that the two specimens of var. *lawesi* have their breadth, index of breadth, and capacity markedly below, and their rostral index markedly above, any individuals of the other races; but this is obviously owing to the want of more material, since there are only two specimens available for comparison, *both of which are females*; and it must especially be remembered that the points of difference just noted in *E. lawesi* are the very ones in which the sexes differ from each

[1] Mons. F. Lataste (Bull. Soc. Acclim. (3) x. p. 369, 1883) has shown that desert animals, such as *Dipodillus simoni* and *Pachyuromys duprasi*, are certain to die of rickets and other bone-diseases if, when in captivity, they are not supplied with abundance of carbonate of lime; a fact which proves that such desert animals are accustomed to a more liberal supply than usual of this or some allied bone-forming salt.

	Greatest length.	Greatest breadth.	Index of breadth.	Length of brain-case.	Length of rostrum.	Rostral index.	Capacity.
	mm.	mm.		mm.	mm.		c. cm.
Var. *lawesi*.							
f'. ♀. Port Moresby	106·0	39·7	37·5	48·0	52·5	109·4	18
g'. ♀. Port Moresby	108·4	41·0	37·8	48·0	55·0	114·6	17
[*Hypothetical* ♂	104·7	43·2	41·3	48·3	50·6	104·9	19·5]
Var. *aculeata*.							
h'. ♂.[1] Central Queensland	104·0	43·5	41·8	53·0	45·3*	85·5*	23
i'. ♀. Central Queensland	110·0	45·0	40·9	52·0	52·0	100	22
n'. ♂. ?	118·0	47·8	40·5	58·0	54·0	93·1	
p'. West Australia	104·0	43·3	41·6	48·4	49·6	102·5	26
q'. ?	118·5	49·0	41·4	55·5	57·2	103·1	27
Var. *setosa*.							
r'. ♂	108·4	49·0	45·2	52·3	49·0	93·7	30
s'. ♀	111·0	45·7	41·2	52·0	52·0	100·0	27
u'. ♂. Tasmania	118·5	48·5	40·9	53·8	57·7	107·2	33
x'. Tasmania	107·7	45·5	42·2	51·0	50·0	98·0	29
y'. Tasmania	101·0	45·0	44·6	49·5	45·0	90·9	28
a''. Tasmania	103·7	46·0	44·4	49·3	48·5	98·4	28
b''.	111·0	49·6	44·7	54·0	51·0	94·4	37
d''.	125·0	54·0	43·2	58·0	59·0	101·7	
Averages:—							
Var. *lawesi*	107·2	40·3	37·6	48·0	53·7	112·0	17·5
Var. *aculeata*	110·9	45·7	41·2	53·4	53·2	99·7	24·5
Var. *setosa*	110·8	47·9	43·3	52·5	51·5	98·0	30·3
[*Proechidna bruijnii*. New Guinea	167·0	53·5	32·0	58·0	100·0	172·4	44·0]

[1] This specimen seems to have an unnaturally short snout, and therefore the rostral length and index (*) are not included in the general averages below.

other, and that a male *lawesi* would probably be very much more like *aculeata* than are the two females examined. To show this the dimensions of a hypothetical male skull, based by simple rule of three on the relations to each other of specimens r' and s', the typical male and female skulls of *setosa* already described and figured, have been placed below those of the female specimens of *lawesi* in the table, and these, which are probably not very far from what average male skulls would measure, show that no sharp dividing line can be drawn between the skull proportions of *lawesi* and *aculeata*. Still less can one be drawn between *aculeata* and *setosa*, as the various numbers intergrade completely.

I regret that I am unable to retain, even as a variety, *E. acanthion*, Collett, the types of which have been kindly lent to me by the describer. It seems to me to be what I might call a hyper-typical form of *aculeata*, not worthy of a separate name, but exceedingly interesting as supplying the much needed intermediate link between *E. aculeata* and *E. lawesi*.

With regard to the interesting character of cranial capacity, the variation between the different races and individuals is extremely striking, such a range as from 17 to 37 c. cm. being probably unequalled among mammals; and even within the varieties we find such ranges as from 22 to 27 in *aculeata*, and from 27 to 37 in *setosa*. The even increase of capacity, however, from north to south is a fact of great interest, and gives an excellent example of the general law as to increase of size with increase of latitude, which is now one of the most fully recognized of the laws governing the variation of mammals.

This law, however, as Mr. J. A. Allen has shown [1], is reversed in the case of essentially tropical groups, their members then becoming smaller and smaller according as they live further and further away from what Mr. Allen calls their "centre of distribution." The fact therefore that *Echidna* conforms to the general rule is exceedingly interesting, and tends to prove that it is essentially a temperate and not a tropical genus, and that the New-Guinean *E. lawesi* must be looked upon as a more or less degenerate tropical offshoot of *E. aculeata*. But, on the other hand, speaking of the whole family, its very largest member, the *Proechidna bruijnii*, occurs at the most northern and tropical situation of all, namely in north-western New Guinea; so that this is in direct contradiction to Mr. Allen's further rule that the largest species of a family are those that have their habitat nearest to its "centre of distribution." We have therefore in the *Echidnidæ* the apparent anomaly of two centres of highest development, the one, tropical, applying to the family as a whole, and causing *P. bruijnii* to be its largest member, and the other, temperate, applying to the individuals of the only widely spread species, and causing them to increase steadily in size from north to south.

On the whole I think that the facts as to the relations to each other of distribution and size in this group tend to show that the genus *Echidna* has existed more or less in its present form for a

[1] Bull. U. S. Geol. Surv. ii. p. 310.

very long time in Australia—long enough in fact to eliminate any specially tropic-loving tendencies it may have inherited from the ancestors common to it and to *Proechidna*.

In this connection it should be just noted that the Pleistocene species *E. oweni*, Krefft[1], from New South Wales, was at least one third larger than the largest existing species of the family.

Comparing the skull-capacity of these Echidnas with the total weight of their bodies, we find that (after being in spirit some years),

Specimen *w*,	with a capacity of	33 c. cm.,	weighs about	2000 grammes.
,, *p*,	,,	30	,,	2600 ,,
,, *q*,	,,	27	,,	2800 ,,

The capacity in cubic centimetres going into the weight in grammes respectively 60, 87, and 104 times; and thus comparing very favourably with the proportions in man, in whom, taking the average capacity as 1500 c. cm., and the average weight as 65,000 gr., the former goes into the latter 43 times. This rough comparison is, however, affected in one direction by the general rule that smaller animals have higher capacities in proportion to their weight than larger; and in the other by the increase of the weight of the specimens of *Echidna* by the spirit which had soaked into the flesh, and could not be dried out. The thick coat of spines also must add an appreciable amount to the weight of so small an animal.

The cranial capacity of a fine Ornithorhynchus, with a skull 113 mm. in length, I find to be 17 c. cm., and therefore only equal to the very smallest of the Echidnas examined.

To sum up the general conclusions arrived at, we find that certain well-known laws of climatic and geographical variation have caused the original *Echidna* to show certain modifications at the extremities of its range as follows:—

	Result.
1. The inhabitants of a wet and cold climate need a warm covering.	Long thick hair of var. *setosa*.
2. A moist and fertile soil is heavier to work than a dry and sandy one.	Greater digging power of var. *setosa* by increase of length of third hind claw.
3. A cold climate produces greater size, and, at the same time,	Greater size, especially marked by larger skull and brain-capacity of *setosa*.
4, a reduction and shortening of extremities.	Shorter snout of var. *setosa*.
[? 5. On moist and heavy soils there is a less supply of carbonate of lime available for bone-making purposes than on sandy.]	Greater tendency of var. *setosa* to have open vacuities on base of skull.

[1] Ann. Mag. N. H. (4) i. p. 113 (1868). Probably the same as *E. ramsayi*, Owen, Phil. Trans. clxxv. p. 273, pl. xiv. (1884).

These modifications are, so to speak, the characters of incipient species; but in my opinion they have neither yet gone far enough, nor are yet sufficiently constant to necessitate our recognizing more than a single species of true *Echidna*, with three geographical varieties, of which the characters and synonymy are as follows.

1. E. ACULEATA LAWESI. (Plate XXIII. fig. A.)

Tachyglossus lawesi, E. P. Ramsay, P. Linn. Soc. N. S. W. ii. p. 31 (1877), iii. p. 244 (1879); A. Dubois, Bull. Soc. Zool. vi. p. 268 (1881); Peters & Doria, Ann. Mus. Genov. xvi. p. 688 (1881).

Hab. New Guinea (as yet only known from Port Moresby).

Size small. Spines rather short, with the hairs partly visible between them; crown of head, belly, and legs clothed almost entirely with flattened bristles. Third hind claw only from one third to one half the length of the second, and but little larger than the fourth.

Skull small and very narrow (breadth about 41 mm.; index 37 or 38), with a small low brain-case (capacity 17 or 18 cubic centimetres), and with a proportionally long slender snout (rostral index, 109–114). No condyloid vacuities.

2. E. ACULEATA TYPICA. (Plate XXIII. fig. B.)

Myrmecophaga aculeata, Shaw, Nat. Misc. iii. pl. 109 (1792).

Ornithorhynchus hystrix, Home, Phil. Trans. 1802, p. 348, pl. x.

Echidna aculeata, Waterhouse, N. H. Mamm. i. p. 41 (1846); Flower & Garson, Cat. Coll. Surg. ii. p. 751 (1884).

E. hystrix, Cuv. Règn. Anim. i. p. 226 (1817); Gould, Mamm. Austr. i. pl. ii. 1852; Mivart, Tr. Linn. Soc. xxv. p. 379 (1866); Murie, J. Linn. Soc. xvi. p. 413 (1878) (*et auctorum plurimorum*).

E. australiensis, Less. Man. Mamm. p. 318 (1827).

E. longiaculeata, Tiedem. Zoologie, i. p. 592 (1808).

E. acanthion, R. Collett, Forh. Vid. Selsk. No. 13; P. Z. S. 1885, p. 150.

Hab. The whole continent of Australia.

Size medium. Spines very long, entirely hiding the hairs; crown of the head, belly, and legs covered with a mixture of hairs and bristles. Third hind claw as in *lawesi*.

Skull of medium size and proportions (breadth 43–49 mm., index 40 to 42), with a medium-sized brain-case (capacity 22–27 c. cm.), and a long slender snout (rostral index generally from 93 to 103). Condyloid vacuities generally absent.

3. E. ACULEATA SETOSA. (Plate XXIII. figs. C and D.)

"Another species of *Ornithorhynchus*," Home, Phil. Trans. 1802, p. 357, pl. xiii.

Echidna setosa, Cuv. Règn. Anim. i. p. 226 (1817); Waterh.

N. H. Mamm. i. p. 47 (1846); Gould, Mamm. Austr. i. pl. iii. (1849).

E. breviaculeata, Tiedem. Zoologie, i. p. 592.

Hab. Tasmania.

Size large. Spines short and stout, more or less hidden by the long fur, especially in the centre of the back. Crown of head, belly, and legs covered witn thick woolly fur, unmixed with bristles. Third hind claw very nearly as stout and long as the second.

Skull large and broad (breadth 45–50 mm., index 41–45), large rounded brain-case (capacity 27 to 37 c. cm.), and a comparatively short, stout snout (rostral index generally from 90 to 100). Condyloid vacuities generally present.

It may be useful in this connection to give the synonymy of the three-toed Echidna, an animal which, although not yet ten years known, has become possessed of the following formidable array of names:—

PROECHIDNA BRUIJNII.

Tachyglossus bruijnii, Peters & Doria, Ann. Mus. Genov. ix. p. 183 (1876), xvi. p. 687 (1881).

Acanthoglossus bruijnii, Gervais, C. R. p. 990 (1877); Journ. Zool. vi. p. 375; Ostéogr. Monotr. p. 41 (1877).

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For the sake of comparison, the measurements and indices of a skull of this species have been placed at the bottom of the table on p. 335.

EXPLANATION OF PLATES.

PLATE XXIII.

Upper view of skulls of *Echidna* to show geographical variation in size.

Fig. A. Skull of *Echidna aculeata lawesi*, ♀; *g'* of list.
B. Skull of *Echidna aculeata typica*, ♀; *i'* of list.
C. Skull of *Echidna aculeata setosa*, ♀; *s'* of list.
D. " " " *b''* of list.

PLATE XXIV.

Figs. A and B. Skulls of *Echidna aculeata setosa*, ♂ and ♀; *r'* and *s'* of list, showing sexual difference in form.
C. Left hind foot of *Echidna aculeata setosa*.
D. Left hind foot of *Echidna aculeata lawesi*.
E. Back part of base of skull of *Echidna aculcata setosa*, showing open condyloid vacuities.
F. Back part of base of skull of *Echidna aculeata typica*, showing vacuities closed.